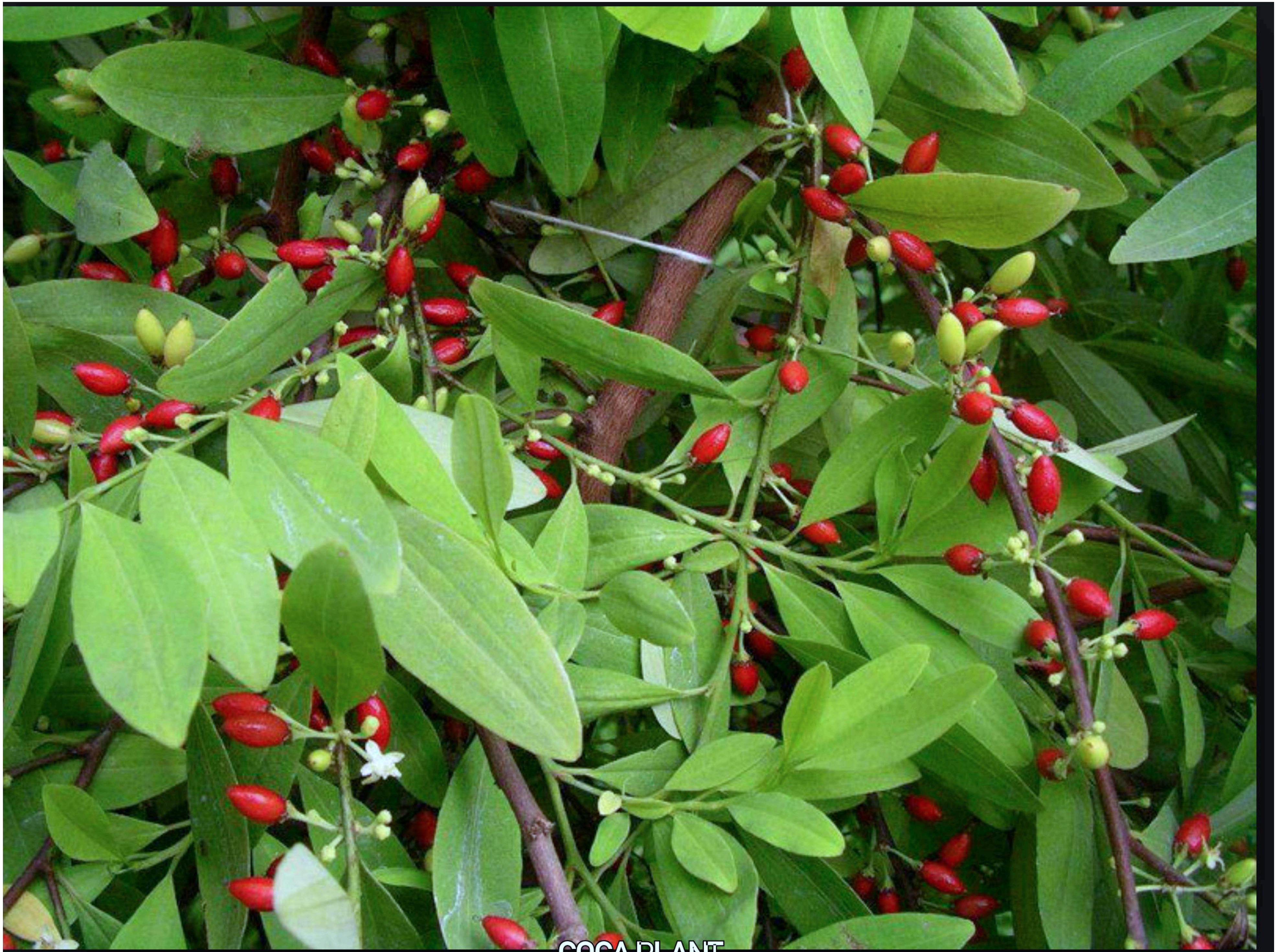

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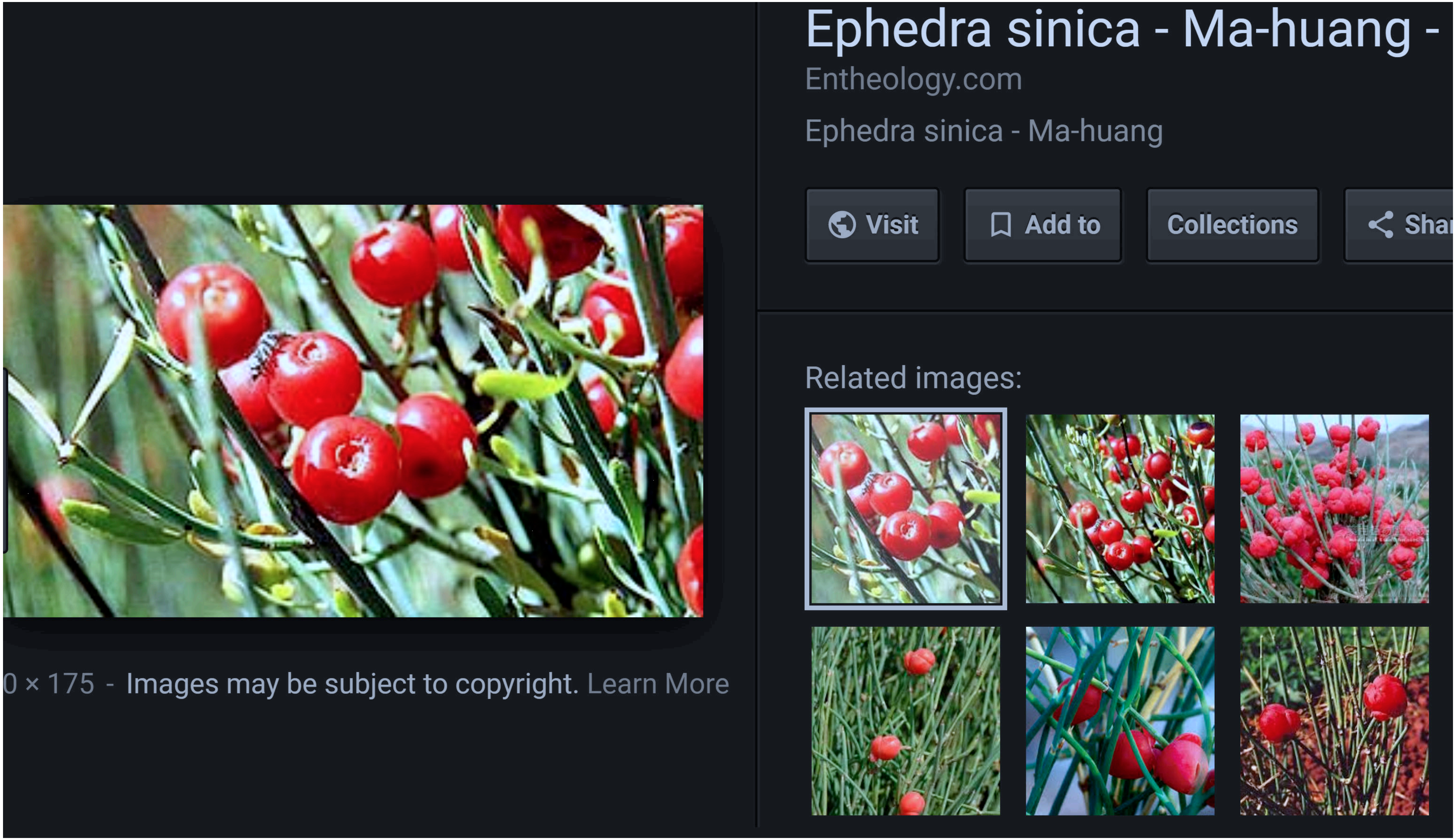

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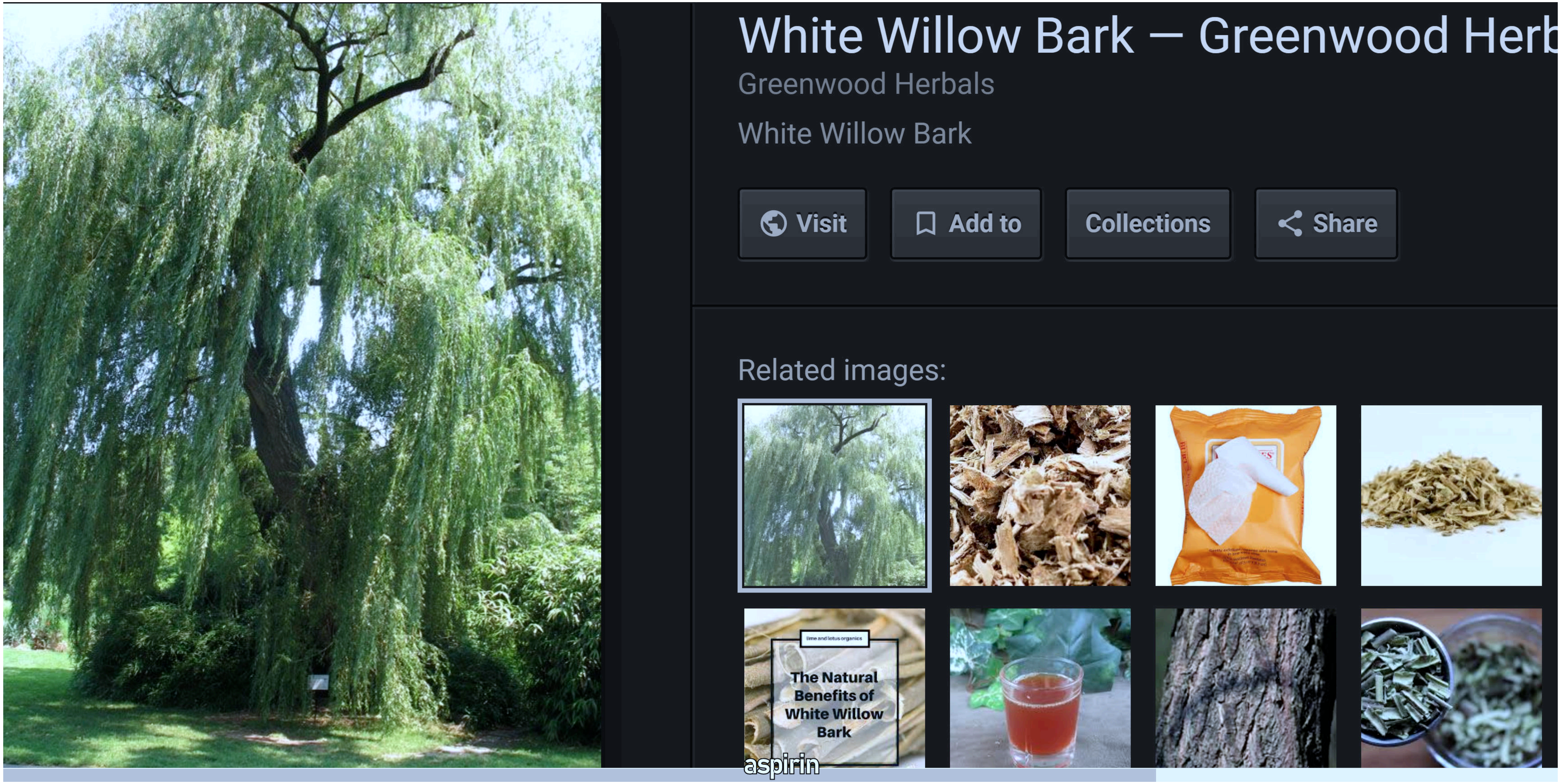

White Willow Bark — Greenwood Herb

Greenwood Herbals

White Willow Bark

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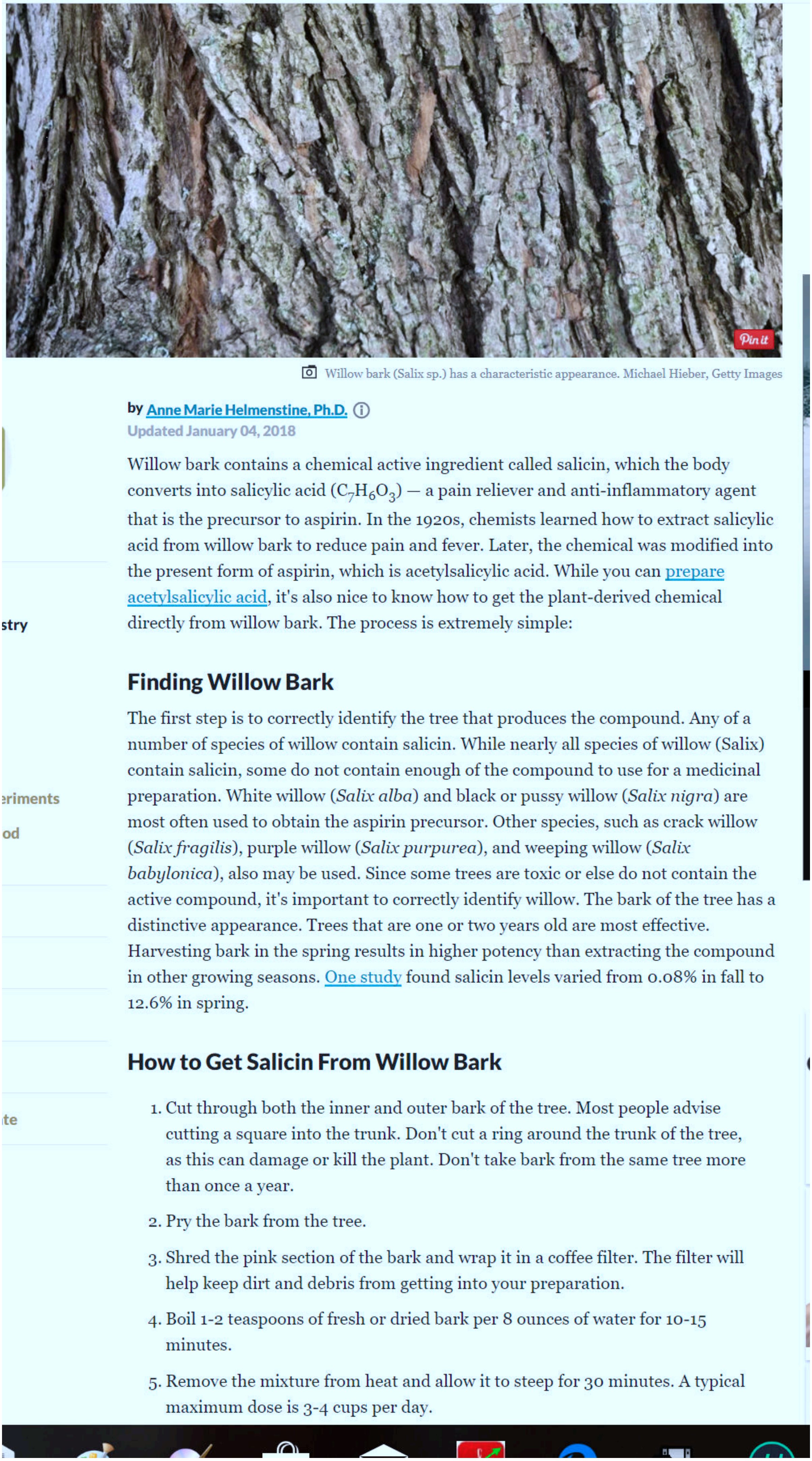

Willow bark (Salix sp.) has a characteristic appearance. Michael Hieber, Getty Images

by **Anne Marie Helmenstine, Ph.D.**
Updated January 04, 2018

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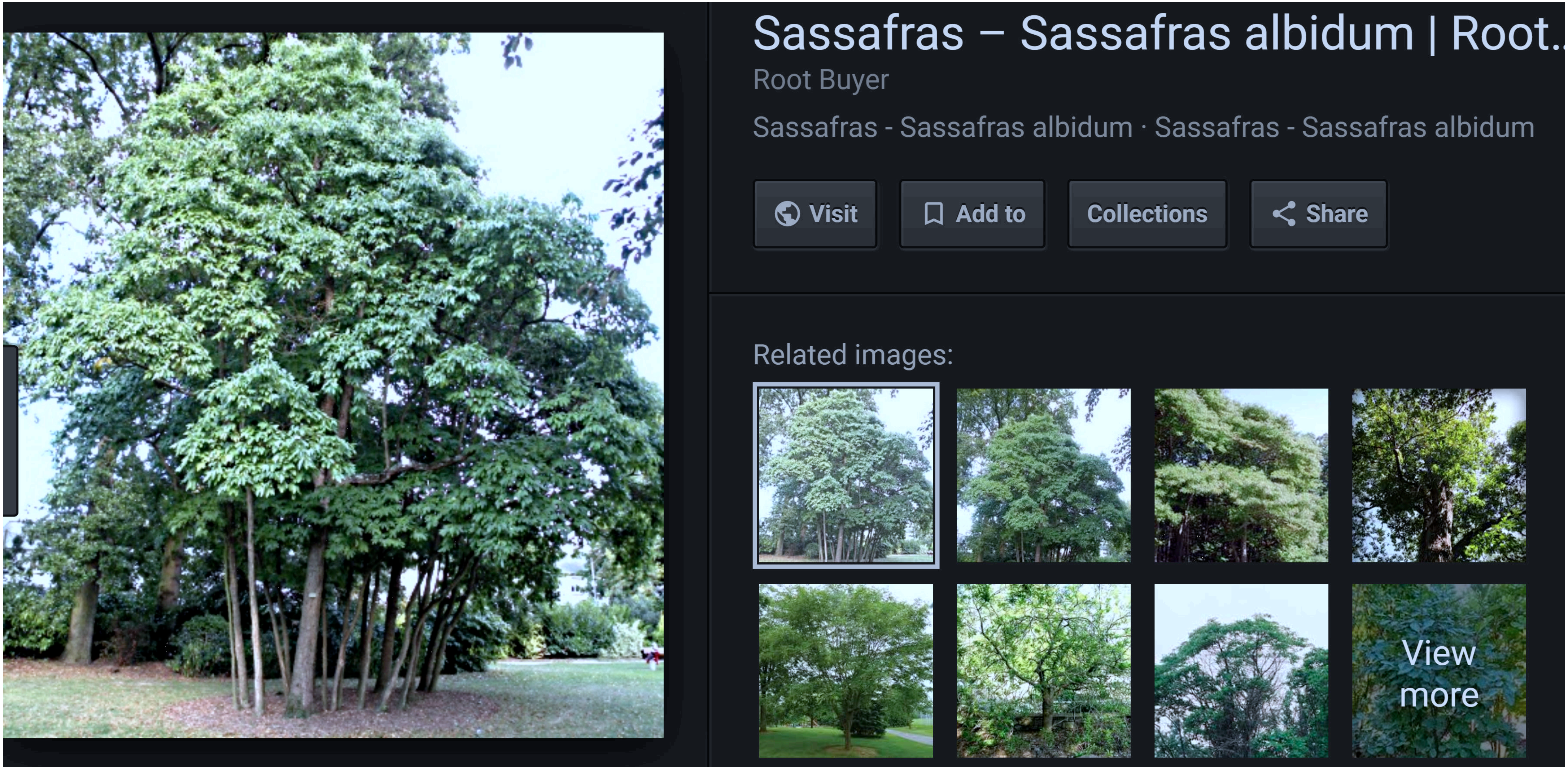
Willow bark contains a chemical active ingredient called salicin, which the body converts into salicylic acid ($C_7H_6O_3$) — a pain reliever and anti-inflammatory agent that is the precursor to aspirin. In the 1920s, chemists learned how to extract salicylic acid from willow bark to reduce pain and fever. Later, the chemical was modified into the present form of aspirin, which is acetylsalicylic acid. While you can prepare acetylsalicylic acid, it's also nice to know how to get the plant-derived chemical directly from willow bark. The process is extremely simple:

Finding Willow Bark

The first step is to correctly identify the tree that produces the compound. Any of a number of species of willow contain salicin. While nearly all species of willow (Salix) contain salicin, some do not contain enough of the compound to use for a medicinal preparation. White willow (*Salix alba*) and black or pussy willow (*Salix nigra*) are most often used to obtain the aspirin precursor. Other species, such as crack willow (*Salix fragilis*), purple willow (*Salix purpurea*), and weeping willow (*Salix babylonica*), also may be used. Since some trees are toxic or else do not contain the active compound, it's important to correctly identify willow. The bark of the tree has a distinctive appearance. Trees that are one or two years old are most effective. Harvesting bark in the spring results in higher potency than extracting the compound in other growing seasons. One study found salicin levels varied from 0.08% in fall to 12.6% in spring.

How to Get Salicin From Willow Bark

1. Cut through both the inner and outer bark of the tree. Most people advise cutting a square into the trunk. Don't cut a ring around the trunk of the tree, as this can damage or kill the plant. Don't take bark from the same tree more than once a year.
2. Pry the bark from the tree.
3. Shred the pink section of the bark and wrap it in a coffee filter. The filter will help keep dirt and debris from getting into your preparation.
4. Boil 1-2 teaspoons of fresh or dried bark per 8 ounces of water for 10-15 minutes.
5. Remove the mixture from heat and allow it to steep for 30 minutes. A typical maximum dose is 3-4 cups per day.



Sassafras – Sassafras albidum | Root..

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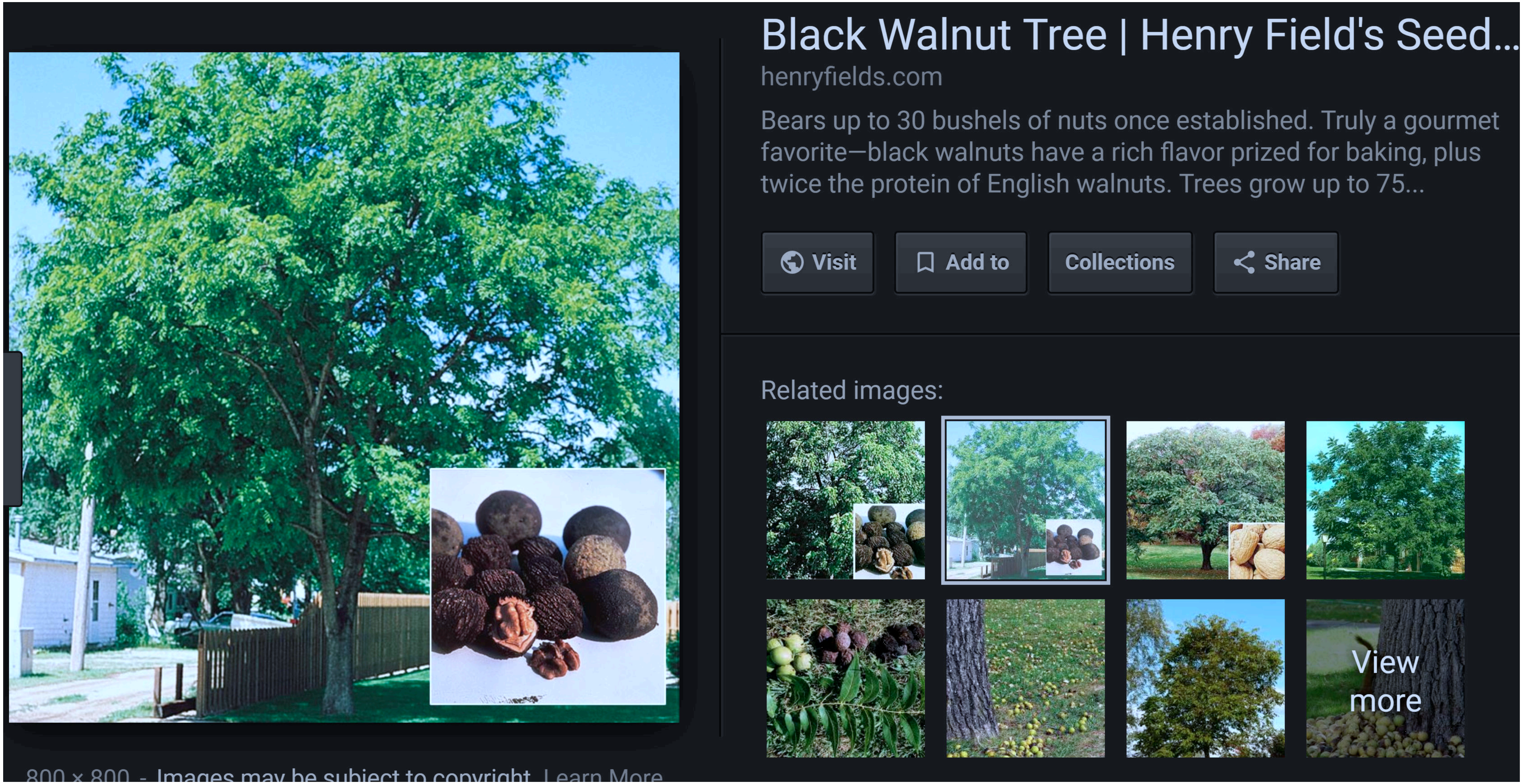

Black Walnut Tree | Henry Field's Seed...

henryfields.com

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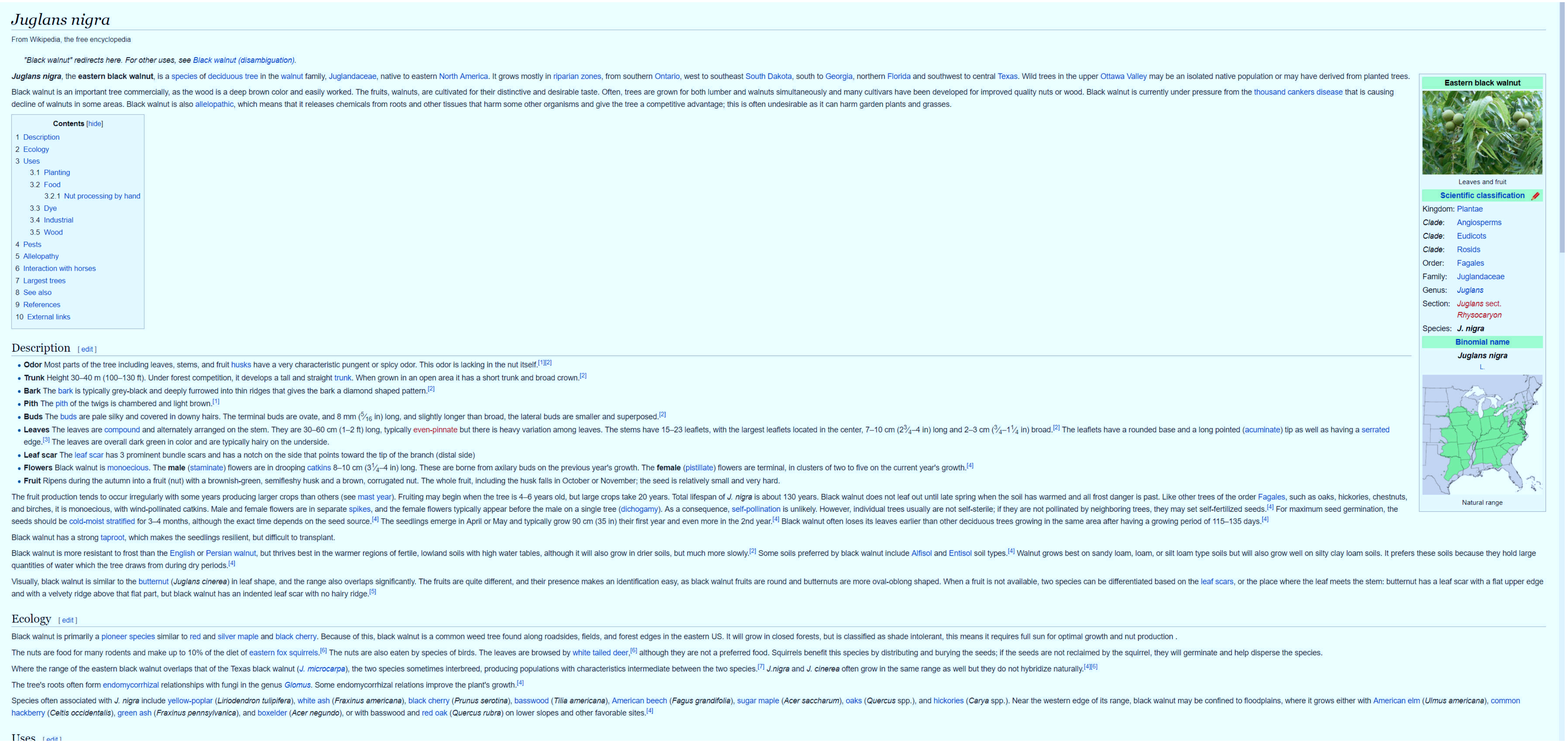


Juglans nigra

From Wikipedia, the free encyclopedia

"Black walnut" redirects here. For other uses, see Black walnut (disambiguation).

Juglans nigra, the **eastern black walnut**, is a species of deciduous tree in the walnut family, Juglandaceae, native to eastern North America. It grows mostly in riparian zones, from southern Ontario, west to southeast South Dakota, south to Georgia, northern Florida and southwest to central Texas. Wild trees in the upper Ottawa Valley may be an isolated native population or may have derived from planted trees.

Black walnut is an important tree commercially, as the wood is a deep brown color and easily worked. The fruits, walnuts, are cultivated for their distinctive and desirable taste. Often, trees are grown for both lumber and walnuts simultaneously and many cultivars have been developed for improved quality nuts or wood. Black walnut is currently under pressure from the thousand cankers disease that is causing decline of walnuts in some areas. Black walnut is also allelopathic, which means that it releases chemicals from roots and other tissues that harm some other organisms and give the tree a competitive advantage; this is often undesirable as it can harm garden plants and grasses.

Contents [hide]

1 Description
2 Ecology
3 Uses
  3.1 Planting
  3.2 Food
    3.2.1 Nut processing by hand
  3.3 Dye
  3.4 Industrial
  3.5 Wood
4 Pests
5 Allelopathy
6 Interaction with horses
7 Largest trees
8 See also
9 References
10 External links

Eastern black walnut

Leaves and fruit

Scientific classification

Kingdom:	Plantae
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Rosids
Order:	Fagales
Family:	Juglandaceae
Genus:	*Juglans*
Section:	*Juglans* sect. *Rhysocaryon*
Species:	***J. nigra***

Binomial name

Juglans nigra
L.

Natural range

Description [edit]

- **Odor** Most parts of the tree including leaves, stems, and fruit husks have a very characteristic pungent or spicy odor. This odor is lacking in the nut itself.[1][2]
- **Trunk** Height 30–40 m (100–130 ft). Under forest competition, it develops a tall and straight trunk. When grown in an open area it has a short trunk and broad crown.[2]
- **Bark** The bark is typically grey-black and deeply furrowed into thin ridges that gives the bark a diamond shaped pattern.[2]
- **Pith** The pith of the twigs is chambered and light brown.[1]
- **Buds** The buds are pale silky and covered in downy hairs. The terminal buds are ovate, and 8 mm ($\frac{5}{16}$ in) long, and slightly longer than broad, the lateral buds are smaller and superposed.[2]
- **Leaves** The leaves are compound and alternately arranged on the stem. They are 30–60 cm (1–2 ft) long, typically even-pinnate but there is heavy variation among leaves. The stems have 15–23 leaflets, with the largest leaflets located in the center, 7–10 cm ($2\frac{3}{4}$–4 in) long and 2–3 cm ($\frac{3}{4}$–$1\frac{1}{4}$ in) broad.[2] The leaflets have a rounded base and a long pointed (acuminate) tip as well as having a serrated edge.[3] The leaves are overall dark green in color and are typically hairy on the underside.
- **Leaf scar** The leaf scar has 3 prominent bundle scars and has a notch on the side that points toward the tip of the branch (distal side)
- **Flowers** Black walnut is monoecious. The **male** (staminate) flowers are in drooping catkins 8–10 cm ($3\frac{1}{4}$–4 in) long. These are borne from axilary buds on the previous year's growth. The **female** (pistillate) flowers are terminal, in clusters of two to five on the current year's growth.[4]
- **Fruit** Ripens during the autumn into a fruit (nut) with a brownish-green, semifleshy husk and a brown, corrugated nut. The whole fruit, including the husk falls in October or November; the seed is relatively small and very hard.

The fruit production tends to occur irregularly with some years producing larger crops than others (see mast year). Fruiting may begin when the tree is 4–6 years old, but large crops take 20 years. Total lifespan of *J. nigra* is about 130 years. Black walnut does not leaf out until late spring when the soil has warmed and all frost danger is past. Like other trees of the order Fagales, such as oaks, hickories, chestnuts, and birches, it is monoecious, with wind-pollinated catkins. Male and female flowers are in separate spikes, and the female flowers typically appear before the male on a single tree (dichogamy). As a consequence, self-pollination is unlikely. However, individual trees usually are not self-sterile; if they are not pollinated by neighboring trees, they may set self-fertilized seeds.[4] For maximum seed germination, the seeds should be cold-moist stratified for 3–4 months, although the exact time depends on the seed source.[4] The seedlings emerge in April or May and typically grow 90 cm (35 in) their first year and even more in the 2nd year.[4] Black walnut often loses its leaves earlier than other deciduous trees growing in the same area after having a growing period of 115–135 days.[4]

Black walnut has a strong taproot, which makes the seedlings resilient, but difficult to transplant.

Black walnut is more resistant to frost than the English or Persian walnut, but thrives best in the warmer regions of fertile, lowland soils with high water tables, although it will also grow in drier soils, but much more slowly.[2] Some soils preferred by black walnut include Alfisol and Entisol soil types.[4] Walnut grows best on sandy loam, loam, or silt loam type soils but will also grow well on silty clay loam soils. It prefers these soils because they hold large quantities of water which the tree draws from during dry periods.[4]

Visually, black walnut is similar to the butternut (*Juglans cinerea*) in leaf shape, and the range also overlaps significantly. The fruits are quite different, and their presence makes an identification easy, as black walnut fruits are round and butternuts are more oval-oblong shaped. When a fruit is not available, two species can be differentiated based on the leaf scars, or the place where the leaf meets the stem: butternut has a leaf scar with a flat upper edge and with a velvety ridge above that flat part, but black walnut has an indented leaf scar with no hairy ridge.[5]

Ecology [edit]

Black walnut is primarily a pioneer species similar to red and silver maple and black cherry. Because of this, black walnut is a common weed tree found along roadsides, fields, and forest edges in the eastern US. It will grow in closed forests, but is classified as shade intolerant, this means it requires full sun for optimal growth and nut production .

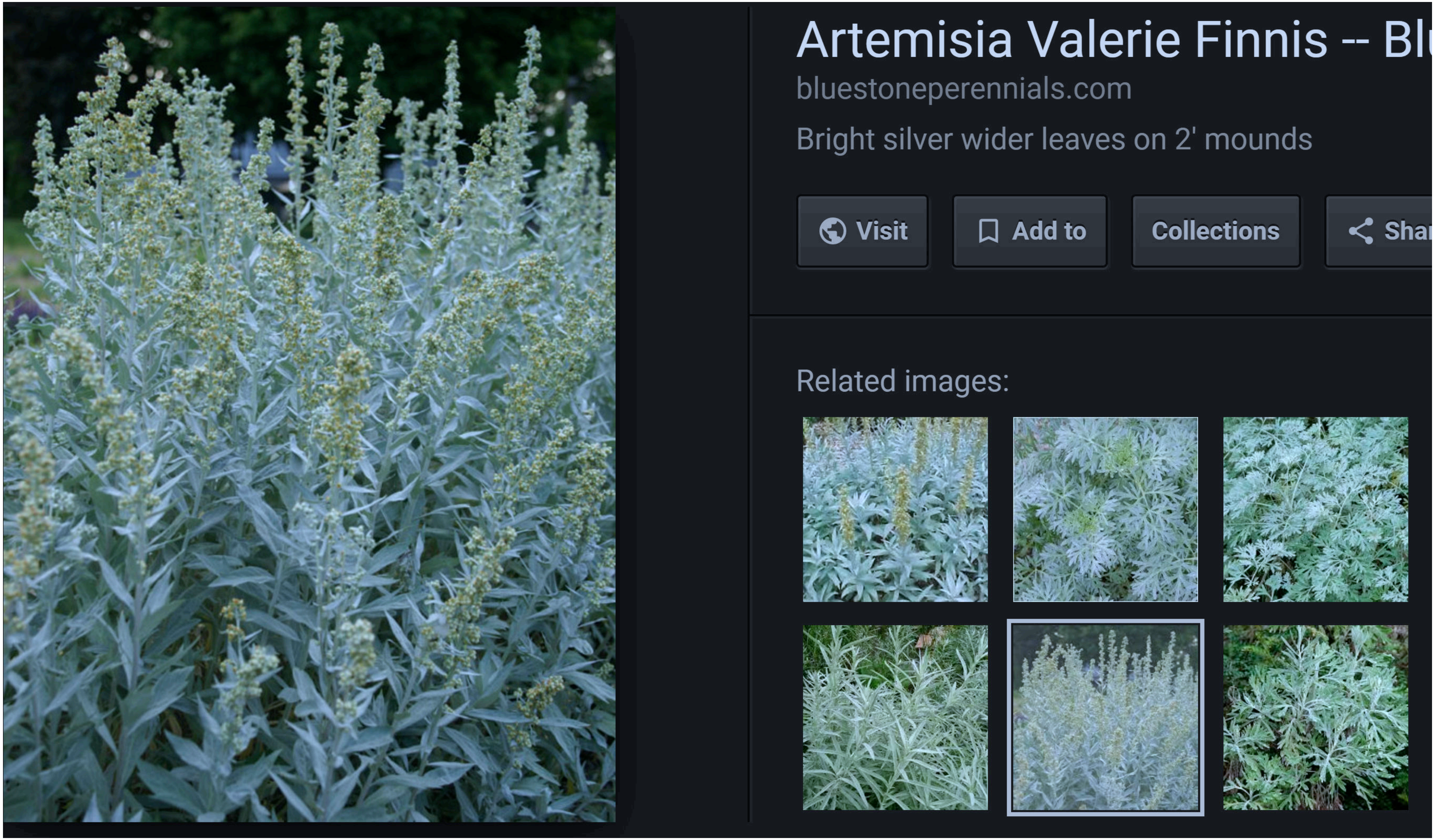
The nuts are food for many rodents and make up to 10% of the diet of eastern fox squirrels.[6] The nuts are also eaten by species of birds. The leaves are browsed by white tailed deer,[6] although they are not a preferred food. Squirrels benefit this species by distributing and burying the seeds; if the seeds are not reclaimed by the squirrel, they will germinate and help disperse the species.

Where the range of the eastern black walnut overlaps that of the Texas black walnut (*J. microcarpa*), the two species sometimes interbreed, producing populations with characteristics intermediate between the two species.[7] *J.nigra* and *J. cinerea* often grow in the same range as well but they do not hybridize naturally.[4][6]

The tree's roots often form endomycorrhizal relationships with fungi in the genus *Glomus*. Some endomycorrhizal relations improve the plant's growth.[4]

Species often associated with *J. nigra* include yellow-poplar (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), basswood (*Tilia americana*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), oaks (*Quercus* spp.), and hickories (*Carya* spp.). Near the western edge of its range, black walnut may be confined to floodplains, where it grows either with American elm (*Ulmus americana*), common hackberry (*Celtis occidentalis*), green ash (*Fraxinus pennsylvanica*), and boxelder (*Acer negundo*), or with basswood and red oak (*Quercus rubra*) on lower slopes and other favorable sites.[4]

Uses [edit]



Artemisia Valerie Finnis -- Bl

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Bright silver wider leaves on 2' mounds

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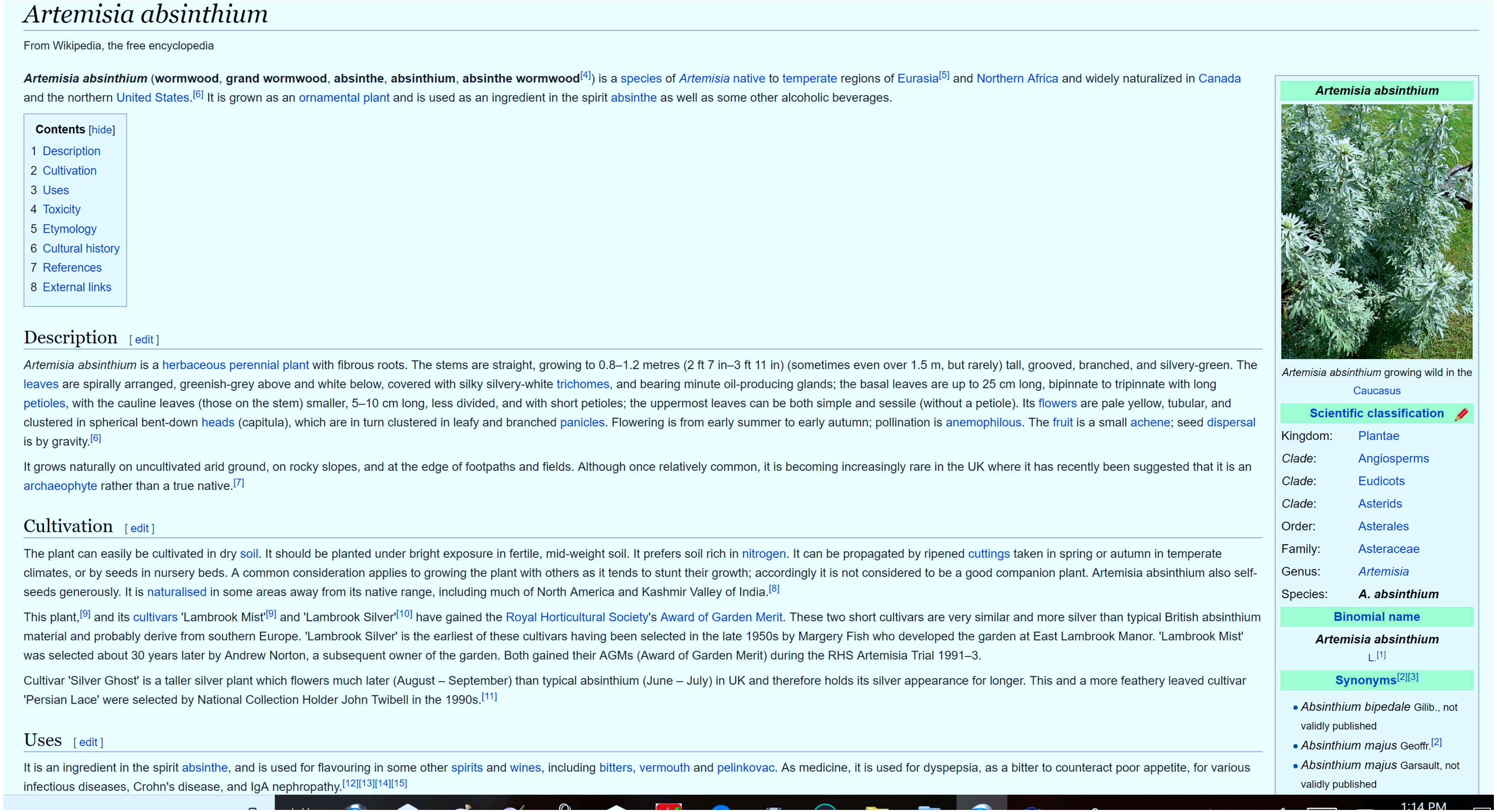


Artemisia absinthium

From Wikipedia, the free encyclopedia

Artemisia absinthium (**wormwood**, **grand wormwood**, **absinthe**, **absinthium**, **absinthe wormwood**[4]) is a species of *Artemisia* native to temperate regions of Eurasia[5] and Northern Africa and widely naturalized in Canada and the northern United States.[6] It is grown as an ornamental plant and is used as an ingredient in the spirit absinthe as well as some other alcoholic beverages.

Contents [hide]

1 Description
2 Cultivation
3 Uses
4 Toxicity
5 Etymology
6 Cultural history
7 References
8 External links

Description [edit]

Artemisia absinthium is a herbaceous perennial plant with fibrous roots. The stems are straight, growing to 0.8–1.2 metres (2 ft 7 in–3 ft 11 in) (sometimes even over 1.5 m, but rarely) tall, grooved, branched, and silvery-green. The leaves are spirally arranged, greenish-grey above and white below, covered with silky silvery-white trichomes, and bearing minute oil-producing glands; the basal leaves are up to 25 cm long, bipinnate to tripinnate with long petioles, with the cauline leaves (those on the stem) smaller, 5–10 cm long, less divided, and with short petioles; the uppermost leaves can be both simple and sessile (without a petiole). Its flowers are pale yellow, tubular, and clustered in spherical bent-down heads (capitula), which are in turn clustered in leafy and branched panicles. Flowering is from early summer to early autumn; pollination is anemophilous. The fruit is a small achene; seed dispersal is by gravity.[6]

It grows naturally on uncultivated arid ground, on rocky slopes, and at the edge of footpaths and fields. Although once relatively common, it is becoming increasingly rare in the UK where it has recently been suggested that it is an archaeophyte rather than a true native.[7]

Cultivation [edit]

The plant can easily be cultivated in dry soil. It should be planted under bright exposure in fertile, mid-weight soil. It prefers soil rich in nitrogen. It can be propagated by ripened cuttings taken in spring or autumn in temperate climates, or by seeds in nursery beds. A common consideration applies to growing the plant with others as it tends to stunt their growth; accordingly it is not considered to be a good companion plant. Artemisia absinthium also self-seeds generously. It is naturalised in some areas away from its native range, including much of North America and Kashmir Valley of India.[8]

This plant,[9] and its cultivars 'Lambrook Mist'[9] and 'Lambrook Silver'[10] have gained the Royal Horticultural Society's Award of Garden Merit. These two short cultivars are very similar and more silver than typical British absinthium material and probably derive from southern Europe. 'Lambrook Silver' is the earliest of these cultivars having been selected in the late 1950s by Margery Fish who developed the garden at East Lambrook Manor. 'Lambrook Mist' was selected about 30 years later by Andrew Norton, a subsequent owner of the garden. Both gained their AGMs (Award of Garden Merit) during the RHS Artemisia Trial 1991–3.

Cultivar 'Silver Ghost' is a taller silver plant which flowers much later (August – September) than typical absinthium (June – July) in UK and therefore holds its silver appearance for longer. This and a more feathery leaved cultivar 'Persian Lace' were selected by National Collection Holder John Twibell in the 1990s.[11]

Uses [edit]

It is an ingredient in the spirit absinthe, and is used for flavouring in some other spirits and wines, including bitters, vermouth and pelinkovac. As medicine, it is used for dyspepsia, as a bitter to counteract poor appetite, for various infectious diseases, Crohn's disease, and IgA nephropathy.[12][13][14][15]

Artemisia absinthium

Artemisia absinthium growing wild in the Caucasus

Scientific classification

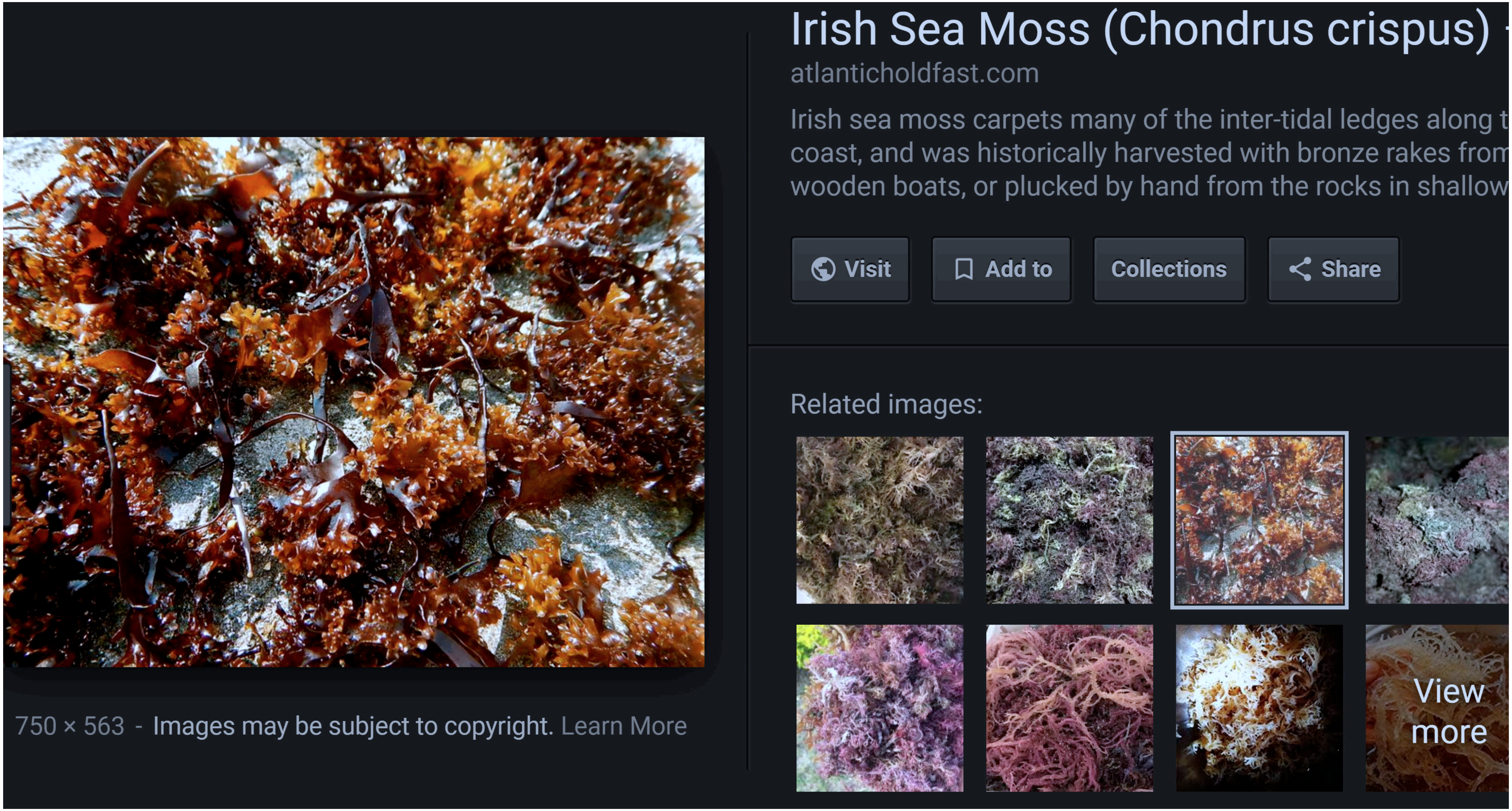
Kingdom:	Plantae
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Asterales
Family:	Asteraceae
Genus:	*Artemisia*
Species:	***A. absinthium***

Binomial name

Artemisia absinthium
L.[1]

Synonyms[2][3]

- *Absinthium bipedale* Gilib., not validly published
- *Absinthium majus* Geoffr.[2]
- *Absinthium majus* Garsault, not validly published



Irish Sea Moss (Chondrus crispus)

atlanticholdfast.com

Irish sea moss carpets many of the inter-tidal ledges along t
coast, and was historically harvested with bronze rakes from
wooden boats, or plucked by hand from the rocks in shallow

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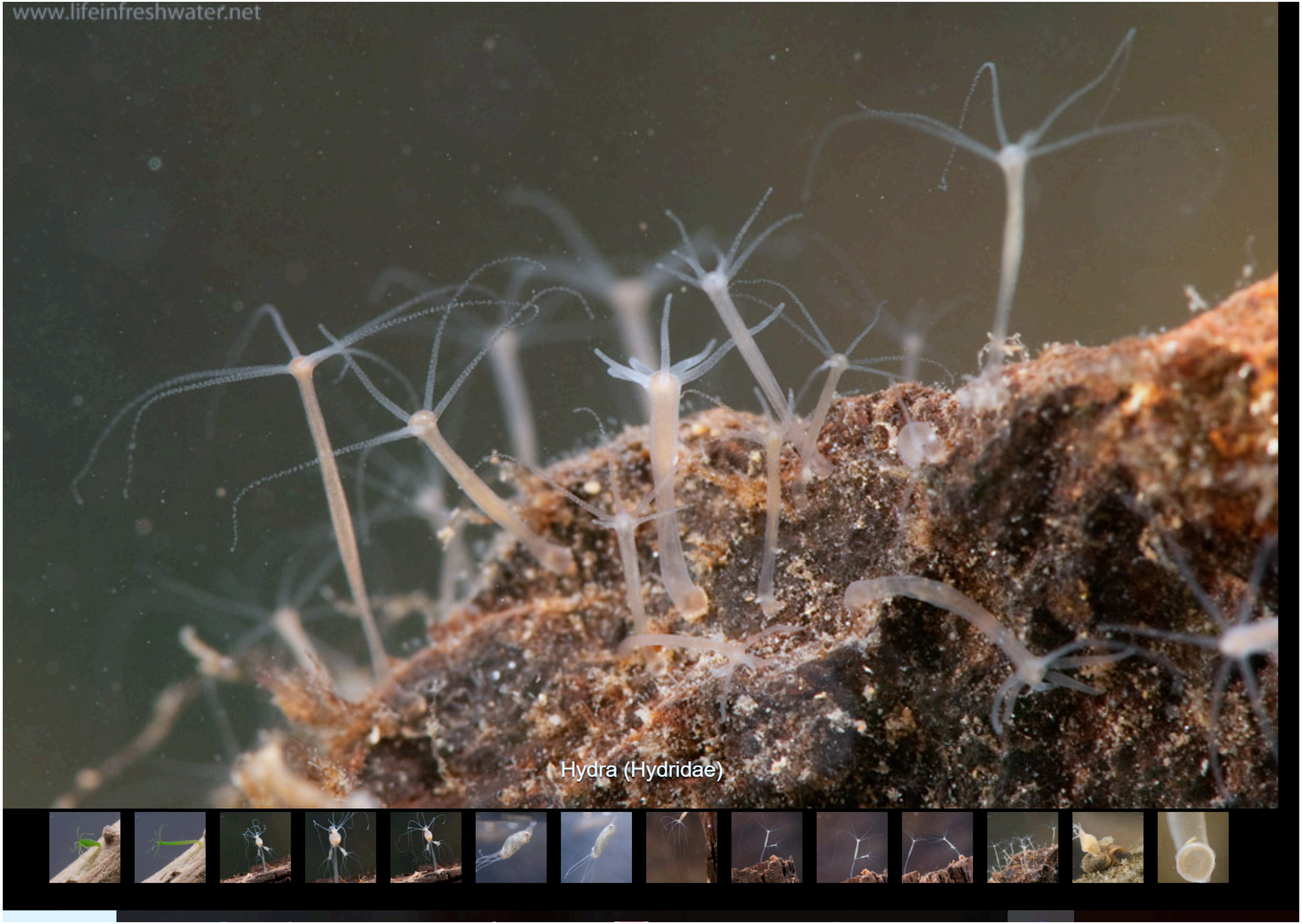

www.lifeinfreshwater.net

Hydra (Hydridae)

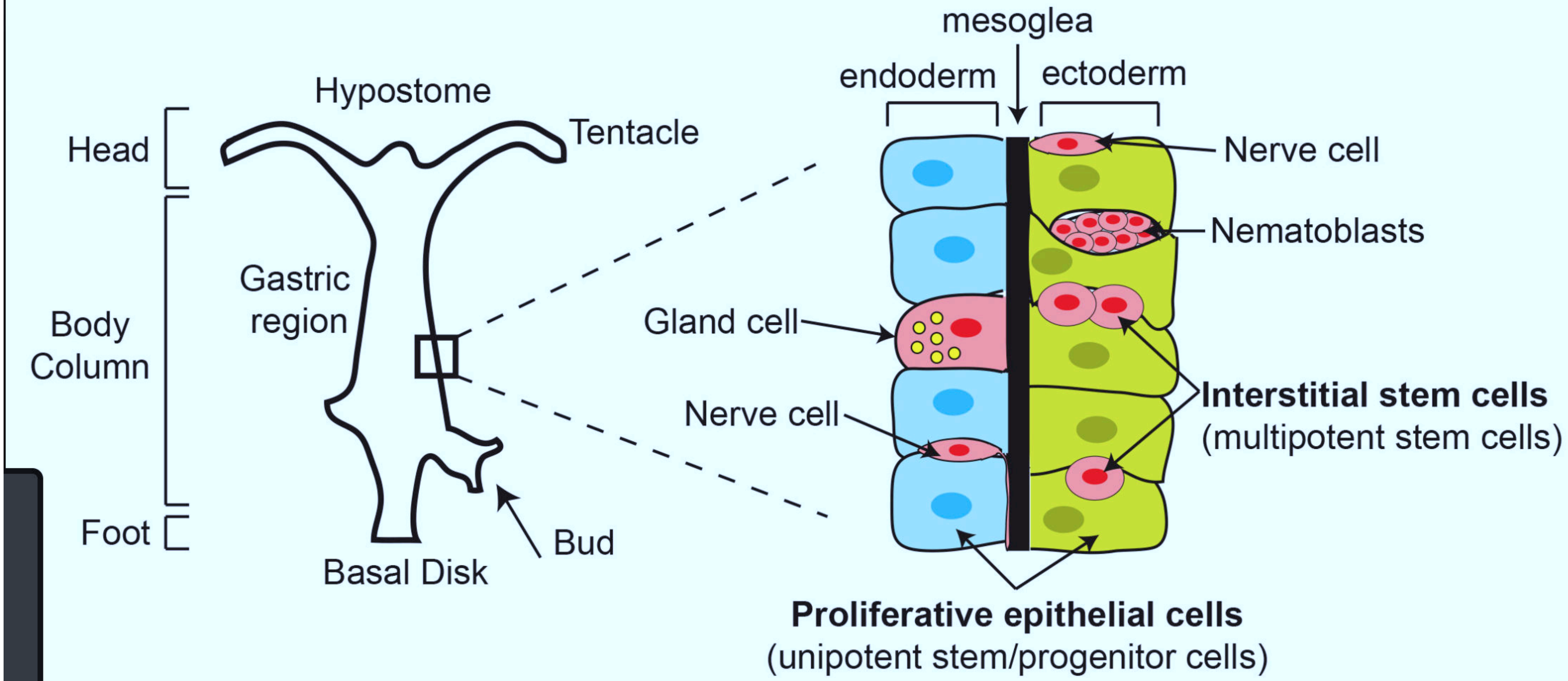
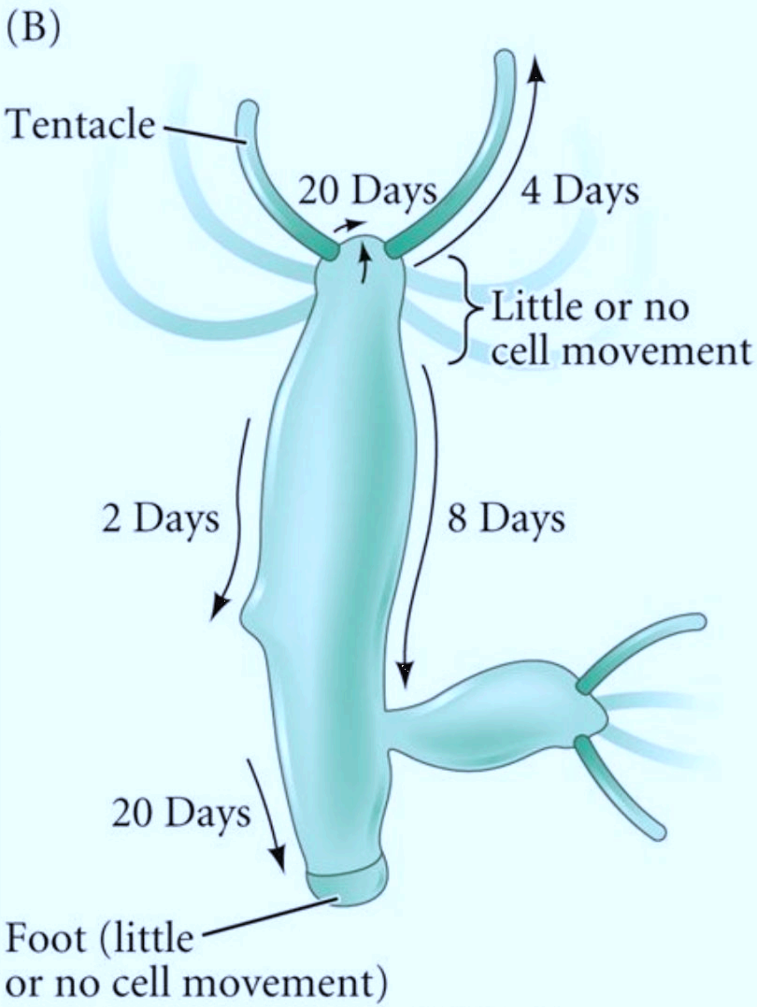

Head
Body Column
Foot
Hypostome
Tentacle
Gastric region
Basal Disk
Bud
mesoglea
endoderm
ectoderm
Nerve cell
Nematoblasts
Gland cell
Nerve cell
Interstitial stem cells
(multipotent stem cells)
Proliferative epithelial cells
(unipotent stem/progenitor cells)

Figure 1 - *Hydra* body plan and stem cell populations. *Hydra* propagates by both asexual budding (arrow) and sexual reproduction (not shown). *Hydra* is composed of three distinct lineages: Ectodermal epithelial (green), Endodermal epithelial (blue) and the Interstitial lineage (pink). The two epithelial lineages form the outside and inside of the body column as two single cell layers separated by the mesoglea, an extracellular matrix. The epithelial cells along the entire length of the body column are **unipotent stem/progenitor cells** that act both as an epithelium and as the source of terminally differentiated cell types found at the extremities (tentacle and basal disk cells). The interstitial lineage is supported by **multipotent stem cells** (I-cells) found in the interstices between the ectodermal epithelial cells of the body column. The I-cells give rise to the nerve cells, gland cells, nematocysts, and germ cells (not shown).


(B)
Tentacle
20 Days
4 Days
Little or no cell movement
2 Days
8 Days
20 Days
Foot (little or no cell movement)

***DEVELOPMENTAL BIOLOGY 10e*, Figure 16.27 (Part 2)**

© 2014 Sinauer Associates, Inc.

- Hydra can reproduce sexually but do so only under adverse conditions. They usually reproduce by budding off a new individual.

- A hydra's body is not stable. The cells of the body column are constantly dividing and are displaced to the extremities of the column from which they are shed. Thus the hydra's body is always regenerating

- The cellular replacement happens from three cell types. The ectodermal and endodermal cells are constantly dividing to produce more epithelia. The third cell type is a multipotent **interstitial stem cell** found in the ectodermal layer which generates the gametesm neurons secretory cells etc.

- The three cell types are all that is needed to form a new hydra.

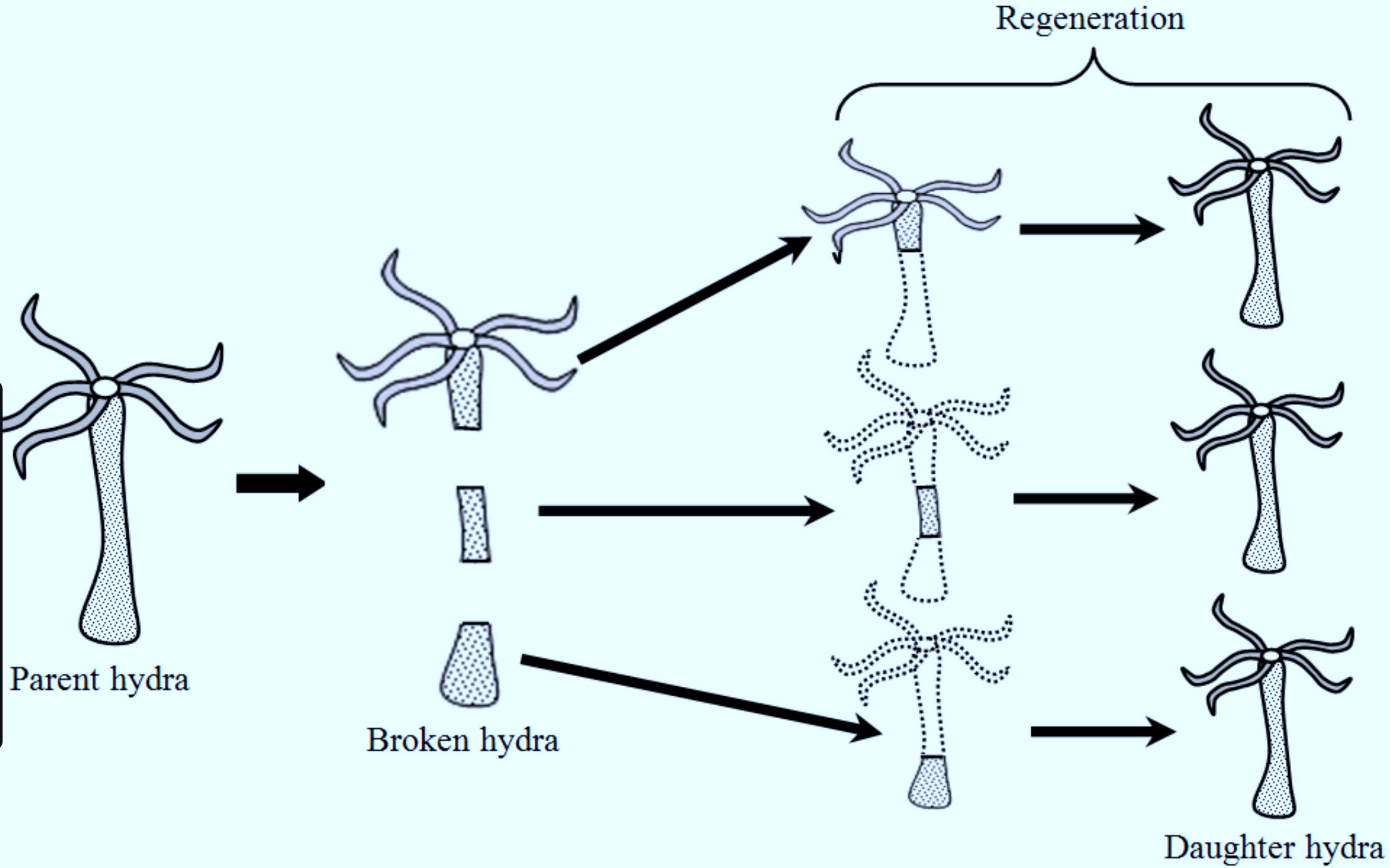
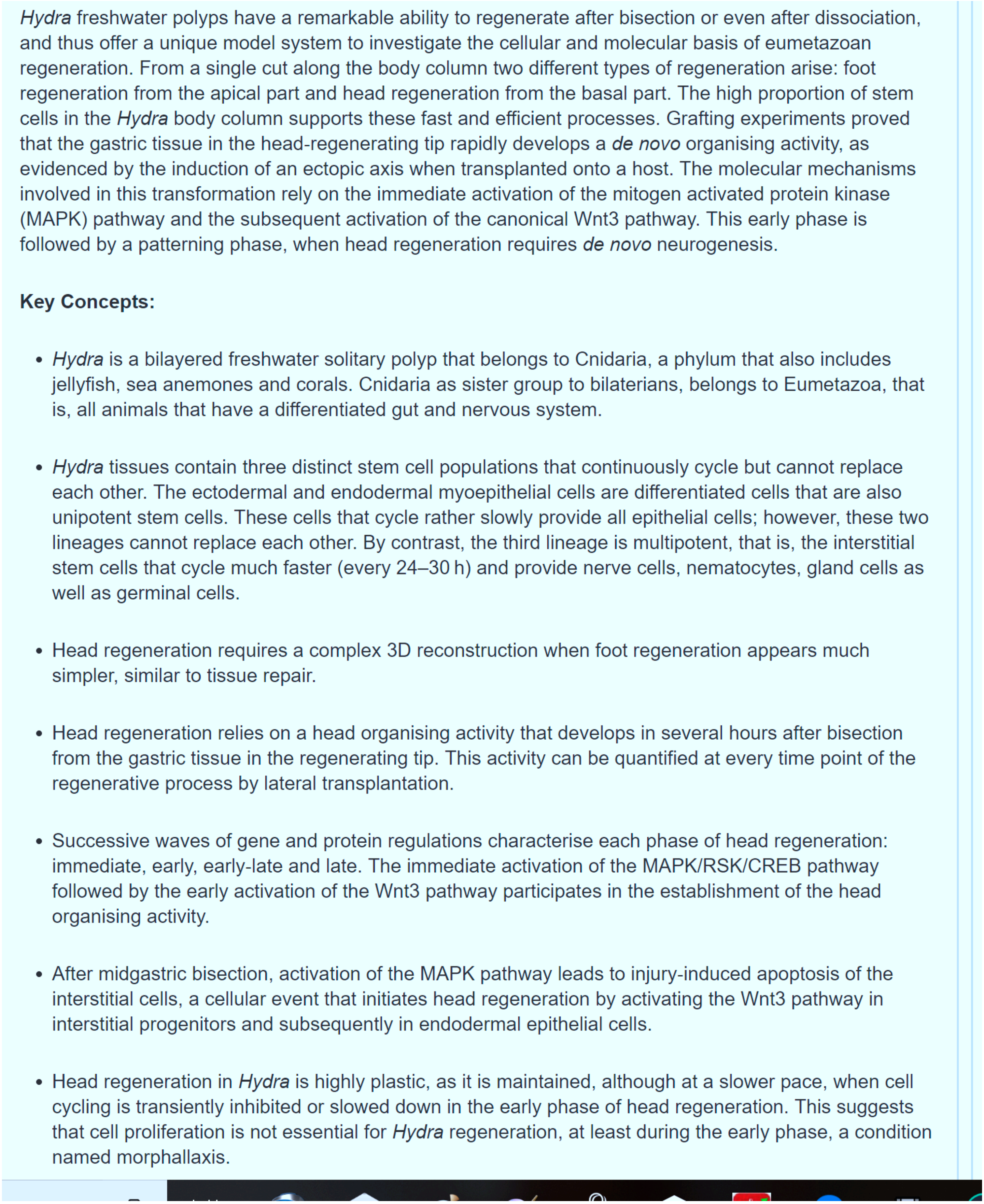

Regeneration
Parent hydra
Broken hydra
Daughter hydra

Fig. 7 Regeneration in hydra



Hydra freshwater polyps have a remarkable ability to regenerate after bisection or even after dissociation, and thus offer a unique model system to investigate the cellular and molecular basis of eumetazoan regeneration. From a single cut along the body column two different types of regeneration arise: foot regeneration from the apical part and head regeneration from the basal part. The high proportion of stem cells in the *Hydra* body column supports these fast and efficient processes. Grafting experiments proved that the gastric tissue in the head-regenerating tip rapidly develops a *de novo* organising activity, as evidenced by the induction of an ectopic axis when transplanted onto a host. The molecular mechanisms involved in this transformation rely on the immediate activation of the mitogen activated protein kinase (MAPK) pathway and the subsequent activation of the canonical Wnt3 pathway. This early phase is followed by a patterning phase, when head regeneration requires *de novo* neurogenesis.

Key Concepts:

- *Hydra* is a bilayered freshwater solitary polyp that belongs to Cnidaria, a phylum that also includes jellyfish, sea anemones and corals. Cnidaria as sister group to bilaterians, belongs to Eumetazoa, that is, all animals that have a differentiated gut and nervous system.

- *Hydra* tissues contain three distinct stem cell populations that continuously cycle but cannot replace each other. The ectodermal and endodermal myoepithelial cells are differentiated cells that are also unipotent stem cells. These cells that cycle rather slowly provide all epithelial cells; however, these two lineages cannot replace each other. By contrast, the third lineage is multipotent, that is, the interstitial stem cells that cycle much faster (every 24–30 h) and provide nerve cells, nematocytes, gland cells as well as germinal cells.

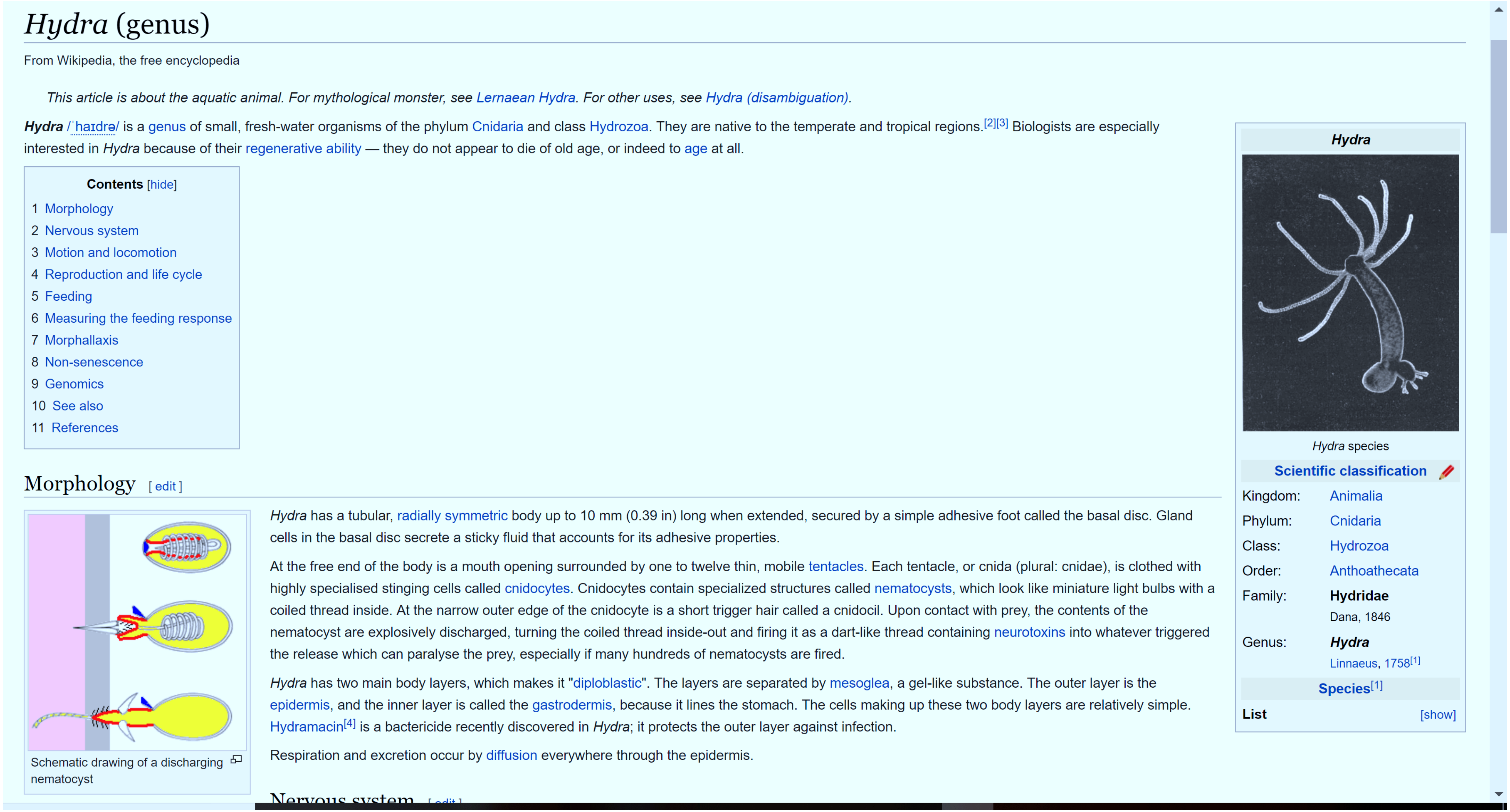
- Head regeneration requires a complex 3D reconstruction when foot regeneration appears much simpler, similar to tissue repair.

- Head regeneration relies on a head organising activity that develops in several hours after bisection from the gastric tissue in the regenerating tip. This activity can be quantified at every time point of the regenerative process by lateral transplantation.

- Successive waves of gene and protein regulations characterise each phase of head regeneration: immediate, early, early-late and late. The immediate activation of the MAPK/RSK/CREB pathway followed by the early activation of the Wnt3 pathway participates in the establishment of the head organising activity.

- After midgastric bisection, activation of the MAPK pathway leads to injury-induced apoptosis of the interstitial cells, a cellular event that initiates head regeneration by activating the Wnt3 pathway in interstitial progenitors and subsequently in endodermal epithelial cells.

- Head regeneration in *Hydra* is highly plastic, as it is maintained, although at a slower pace, when cell cycling is transiently inhibited or slowed down in the early phase of head regeneration. This suggests that cell proliferation is not essential for *Hydra* regeneration, at least during the early phase, a condition named morphallaxis.



Hydra (genus)

From Wikipedia, the free encyclopedia

This article is about the aquatic animal. For mythological monster, see Lernaean Hydra. For other uses, see Hydra (disambiguation).

Hydra /ˈhaɪdrə/ is a genus of small, fresh-water organisms of the phylum Cnidaria and class Hydrozoa. They are native to the temperate and tropical regions.[2][3] Biologists are especially interested in *Hydra* because of their regenerative ability — they do not appear to die of old age, or indeed to age at all.

Hydra

Hydra species

Scientific classification

Kingdom:	Animalia
Phylum:	Cnidaria
Class:	Hydrozoa
Order:	Anthoathecata
Family:	**Hydridae** Dana, 1846
Genus:	***Hydra*** Linnaeus, 1758[1]

Species[1]

List [show]

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1 Morphology
2 Nervous system
3 Motion and locomotion
4 Reproduction and life cycle
5 Feeding
6 Measuring the feeding response
7 Morphallaxis
8 Non-senescence
9 Genomics
10 See also
11 References

Morphology [edit]

Schematic drawing of a discharging nematocyst

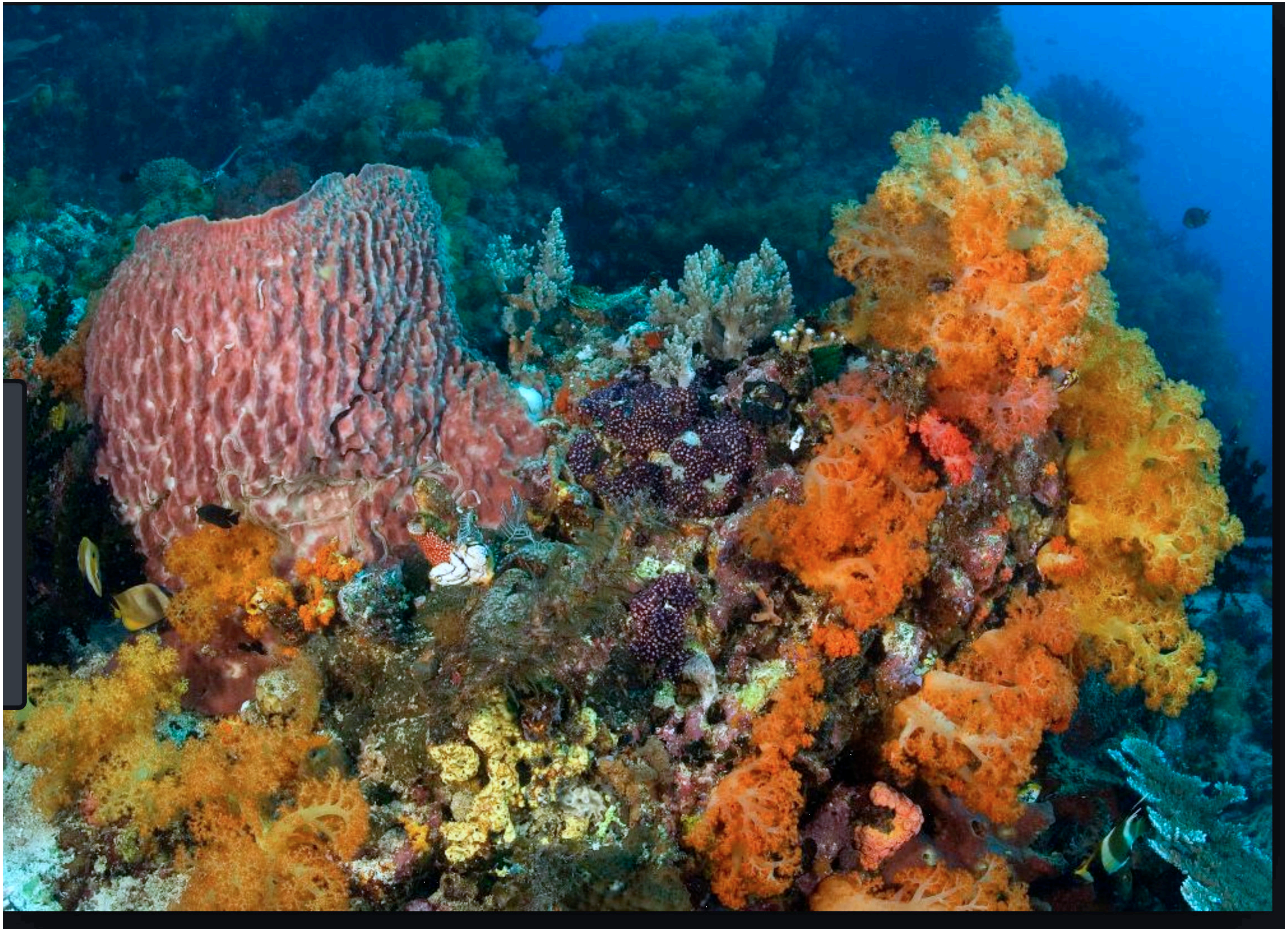
Hydra has a tubular, radially symmetric body up to 10 mm (0.39 in) long when extended, secured by a simple adhesive foot called the basal disc. Gland cells in the basal disc secrete a sticky fluid that accounts for its adhesive properties.

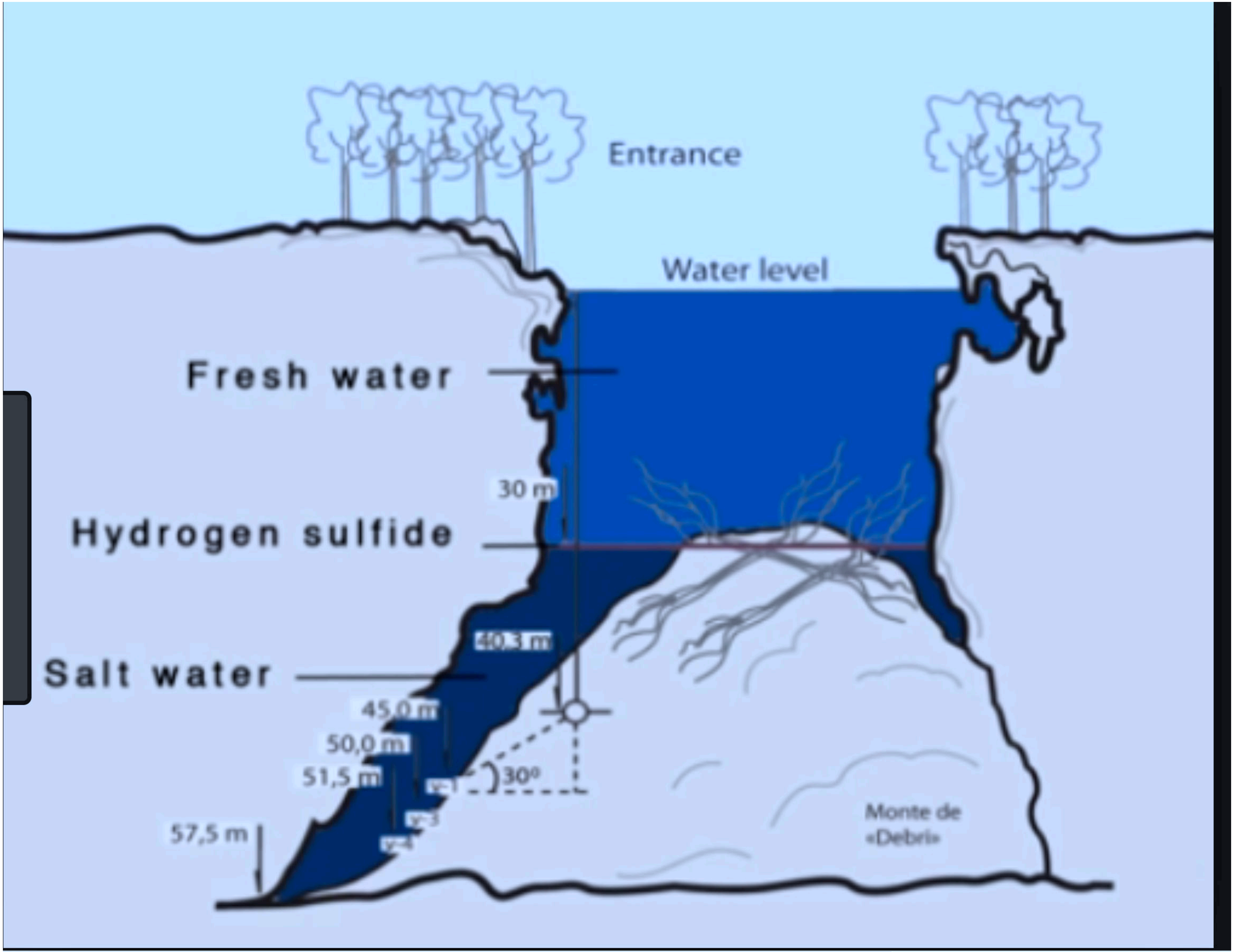
At the free end of the body is a mouth opening surrounded by one to twelve thin, mobile tentacles. Each tentacle, or cnida (plural: cnidae), is clothed with highly specialised stinging cells called cnidocytes. Cnidocytes contain specialized structures called nematocysts, which look like miniature light bulbs with a coiled thread inside. At the narrow outer edge of the cnidocyte is a short trigger hair called a cnidocil. Upon contact with prey, the contents of the nematocyst are explosively discharged, turning the coiled thread inside-out and firing it as a dart-like thread containing neurotoxins into whatever triggered the release which can paralyse the prey, especially if many hundreds of nematocysts are fired.

Hydra has two main body layers, which makes it "diploblastic". The layers are separated by mesoglea, a gel-like substance. The outer layer is the epidermis, and the inner layer is called the gastrodermis, because it lines the stomach. The cells making up these two body layers are relatively simple. Hydramacin[4] is a bactericide recently discovered in *Hydra*; it protects the outer layer against infection.

Respiration and excretion occur by diffusion everywhere through the epidermis.

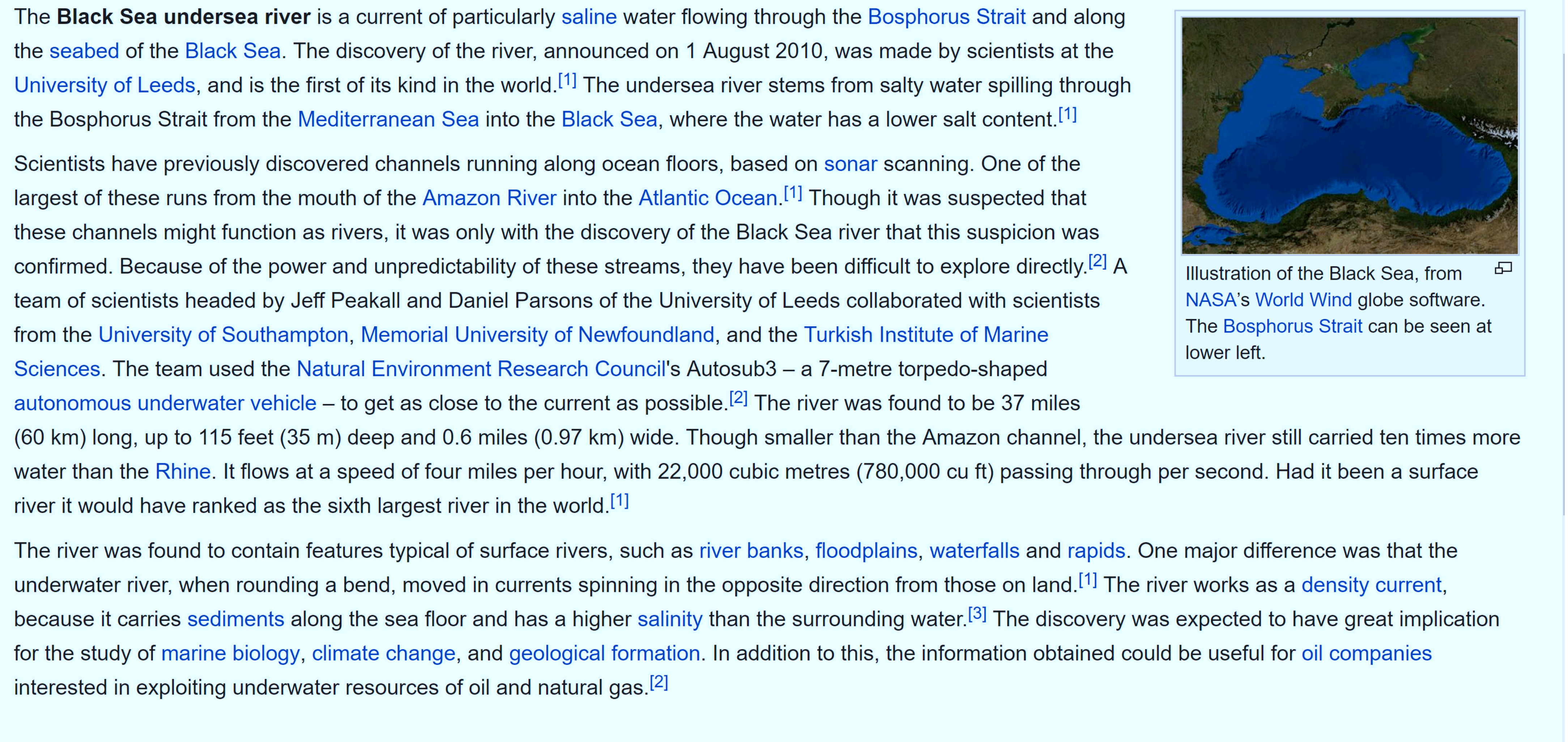
Nervous system [edit]




Entrance
Water level
Fresh water
30 m
Hydrogen sulfide
40,3 m
Salt water
45,0 m
50,0 m
51,5 m
v-1
30⁰
v-3
v-4
57,5 m
Monte de
«Debri»

www.tecdive.ru

Anatoly Beloshchin

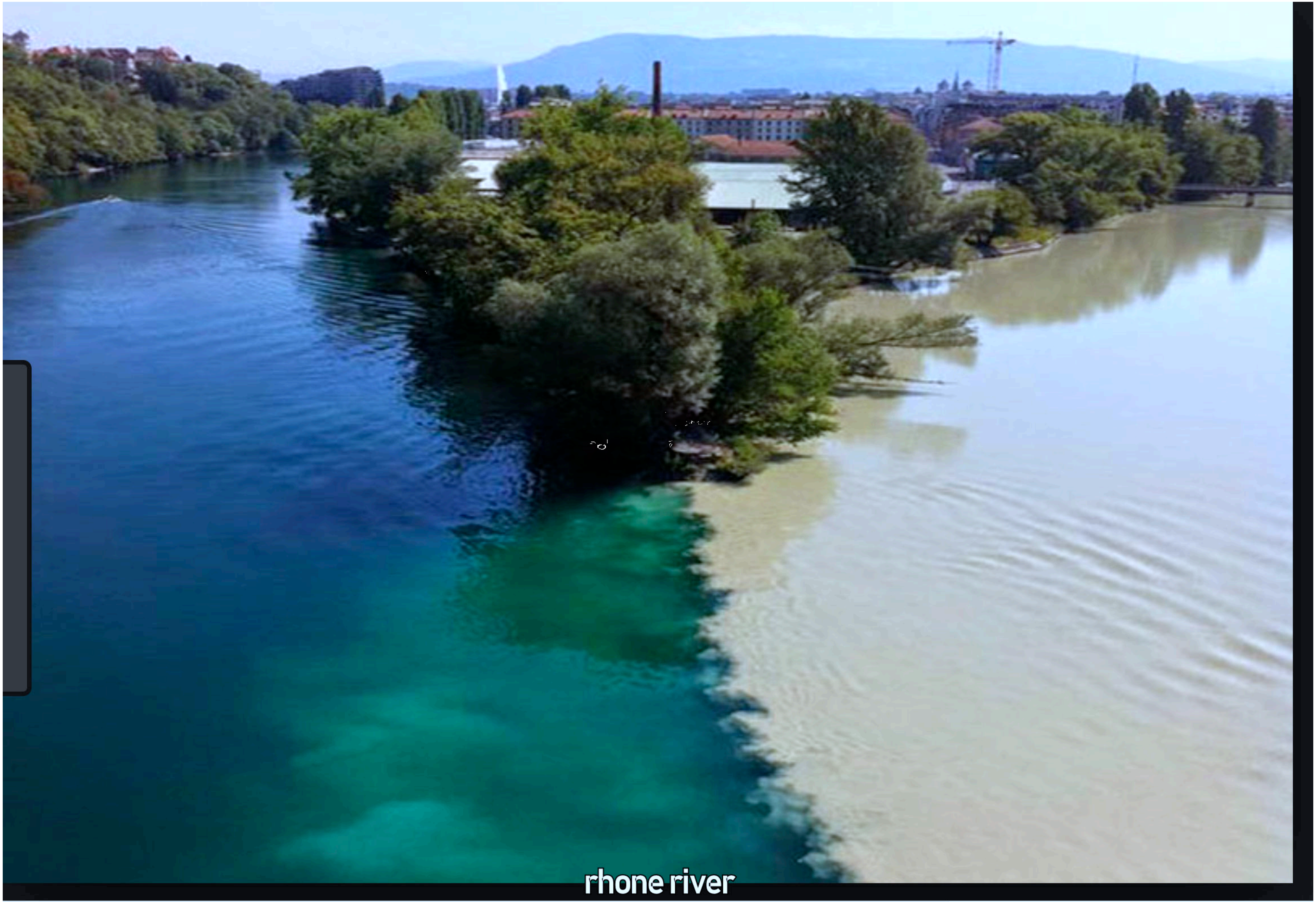


The **Black Sea undersea river** is a current of particularly saline water flowing through the Bosphorus Strait and along the seabed of the Black Sea. The discovery of the river, announced on 1 August 2010, was made by scientists at the University of Leeds, and is the first of its kind in the world.[1] The undersea river stems from salty water spilling through the Bosphorus Strait from the Mediterranean Sea into the Black Sea, where the water has a lower salt content.[1]

Scientists have previously discovered channels running along ocean floors, based on sonar scanning. One of the largest of these runs from the mouth of the Amazon River into the Atlantic Ocean.[1] Though it was suspected that these channels might function as rivers, it was only with the discovery of the Black Sea river that this suspicion was confirmed. Because of the power and unpredictability of these streams, they have been difficult to explore directly.[2] A team of scientists headed by Jeff Peakall and Daniel Parsons of the University of Leeds collaborated with scientists from the University of Southampton, Memorial University of Newfoundland, and the Turkish Institute of Marine Sciences. The team used the Natural Environment Research Council's Autosub3 – a 7-metre torpedo-shaped autonomous underwater vehicle – to get as close to the current as possible.[2] The river was found to be 37 miles (60 km) long, up to 115 feet (35 m) deep and 0.6 miles (0.97 km) wide. Though smaller than the Amazon channel, the undersea river still carried ten times more water than the Rhine. It flows at a speed of four miles per hour, with 22,000 cubic metres (780,000 cu ft) passing through per second. Had it been a surface river it would have ranked as the sixth largest river in the world.[1]

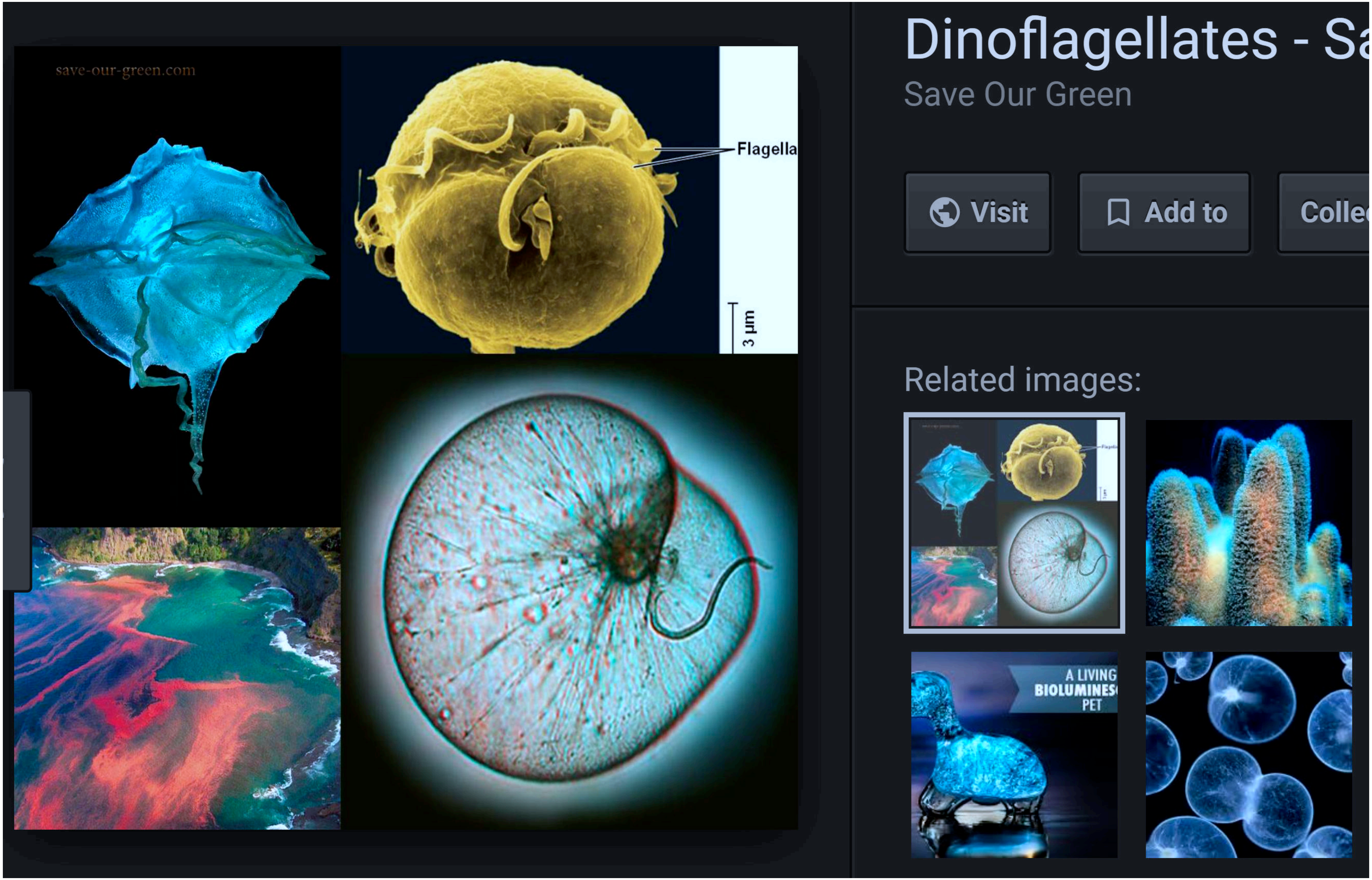
The river was found to contain features typical of surface rivers, such as river banks, floodplains, waterfalls and rapids. One major difference was that the underwater river, when rounding a bend, moved in currents spinning in the opposite direction from those on land.[1] The river works as a density current, because it carries sediments along the sea floor and has a higher salinity than the surrounding water.[3] The discovery was expected to have great implication for the study of marine biology, climate change, and geological formation. In addition to this, the information obtained could be useful for oil companies interested in exploiting underwater resources of oil and natural gas.[2]

Illustration of the Black Sea, from NASA's World Wind globe software. The Bosphorus Strait can be seen at lower left.



rhone river

maldives vaadhoo island



Dinoflagellates - Sa

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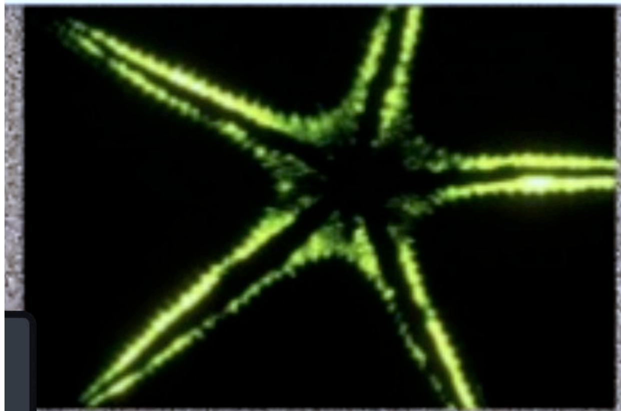
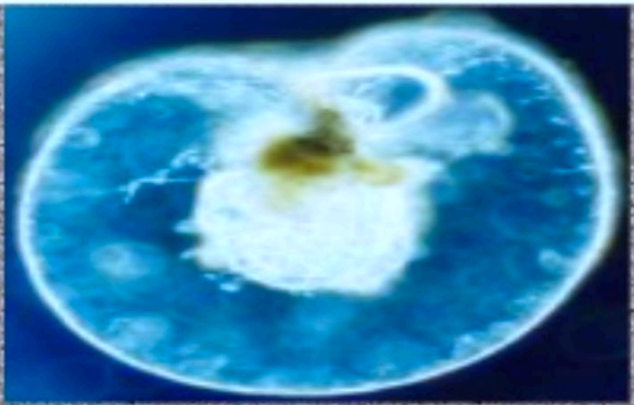
Bioluminescent Organisms

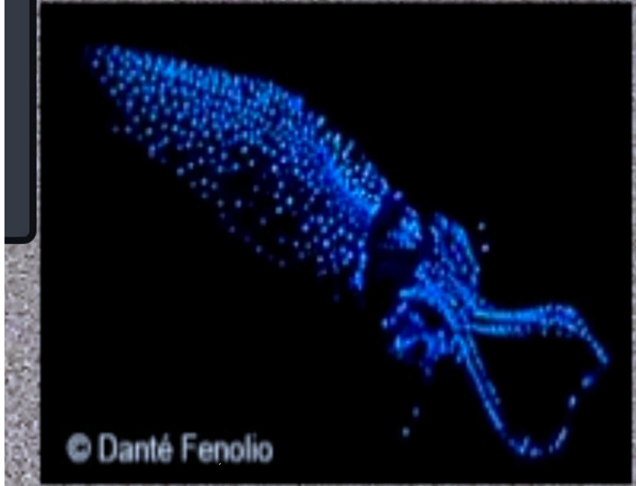


Bioluminescent star fish

Bioluminescent Jelly fish



Bioluminescent alga



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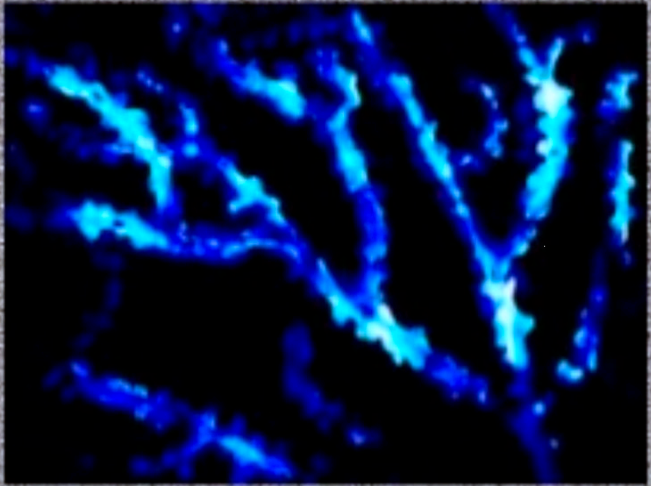
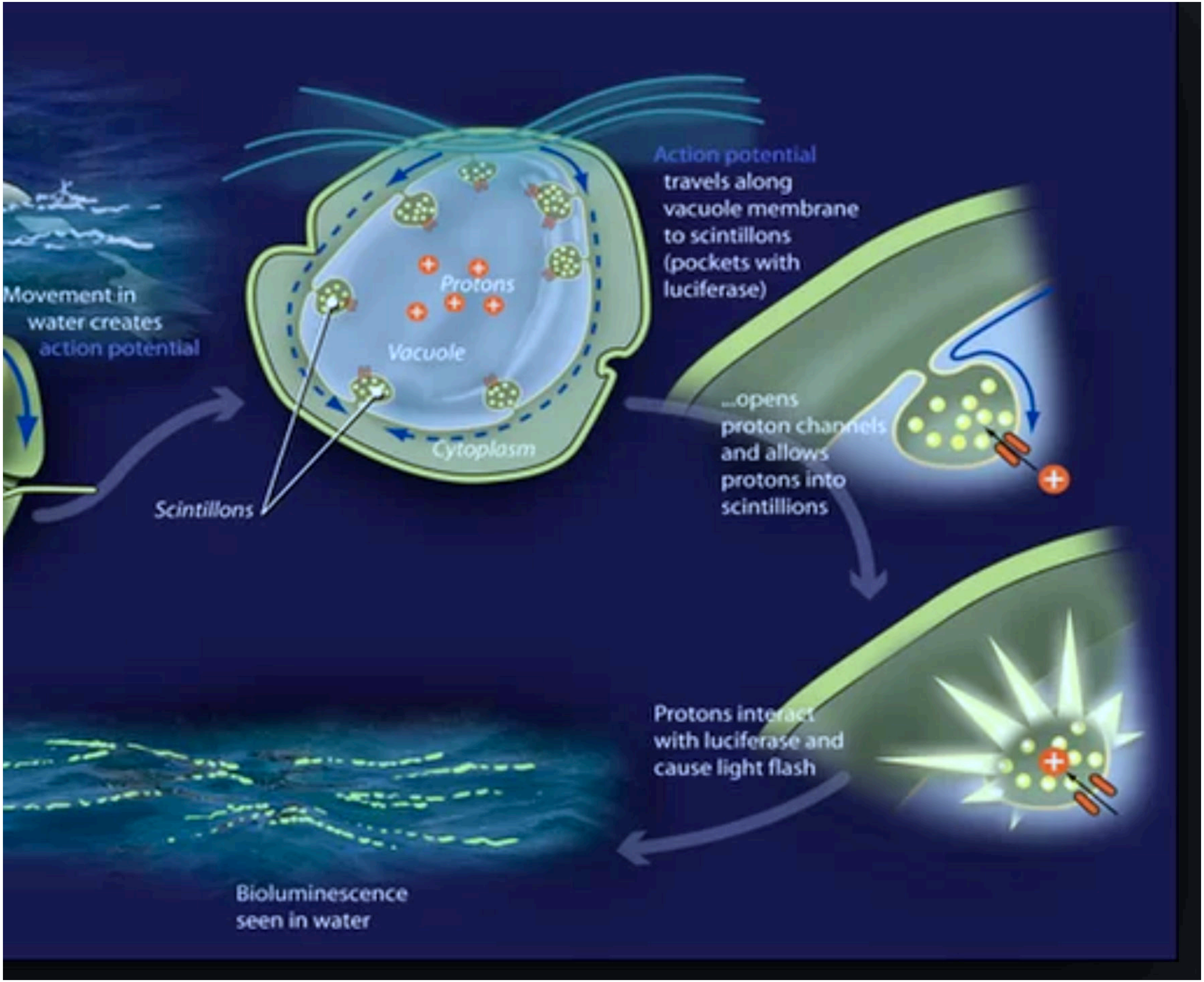
Bioluminescent squid

Bioluminescent Brittle star



Bioluminescent coral


Protons
Vacuole
Cytoplasm
Scintillons

Movement in water creates action potential

Action potential travels along vacuole membrane to scintillons (pockets with luciferase)

...opens proton channels and allows protons into scintillions

Protons interact with luciferase and cause light flash

Bioluminescence seen in water